

CLAIMS

What is claimed is:

Sub
M 1. An iterative computer-implemented process for creating an entity that approximately satisfies a design requirement that at least one characteristic is not in the prior art, the process invoking iterations, each iteration comprising

4 selecting at least one candidate entity, wherein selection is more likely for a
5 candidate entity that satisfies the design requirement to a greater degree than another
6 candidate entity and for a candidate entity that avoids prior art to a lesser degree than
7 another candidate entity; and

8 creating at least one new candidate entity by creating a variation in the at least
9 one candidate entity.

1 2. The process defined in Claim 1 wherein creating at least one new

2 candidate entity comprises mutating the at least one candidate entity.

1 3. The process defined in Claim 2 wherein selecting the at least one
2 candidate entity is performed by simulating annealing.

1 4. The process defined in Claim 2 wherein selecting at least one candidate
2 controller is performed by hill climbing.

1 5. The process defined in Claim 1 wherein the at least one candidate entity is
2 a member of a population of entities.

1 6. The process defined in Claim 5 wherein creating at least one new
2 candidate entity comprises performing a crossover operation among a group of
3 candidate entities, the group of entities comprising the selected entity and at least one
4 other entity from the population, the at least one new coordinate entity created by
5 crossover comprising at least a portion of the selected entity and at least a portion of
6 that at least one other entity.

1 7. The process defined in Claim 1 further comprising performing genetic
2 programming operations.

1 8. The process defined in Claim 1 further comprising genetic algorithms
2 operations.

1 9. The process defined in Claim 1 wherein the at least one candidate entity
2 comprises at least one externally invokable sub-entity and at least one internally
3 invokable sub-entity, the at least one externally invokable sub-entity capable of
4 including at least one invocation of the at least one internally invokable sub-entity.

1 10. The process defined in Claim 9 wherein the at least one candidate entity
2 comprises at least two internally invokable sub-entities and wherein at least one of the
3 at least two internally invokable sub-entities includes at least one invocation of another
4 of the at least two internally invokable sub-entities.

1 11. The process defined in Claim 9 wherein the at least one candidate entity
2 has at least one internally invokable sub-entity that includes at least one invocation of
3 itself.

1 12. The process defined in Claim 1 wherein creating at least one new
2 candidate entity comprises performing an architecture-altering operation involving at
3 least one internally invokable sub-entity of the at least one selected entity.

1 13. The process defined in Claim 1 further comprising creating the at least one
2 candidate entity by a random process.

1 14. The process defined in Claim 1 further comprising supplying, from an
2 external source, the at least one candidate entity partially satisfying the design
3 requirement or that only partially reads on the prior art.

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1 15. The process defined in Claim 1 wherein selecting a candidate entity that
2 more closely satisfies the design requirement is ascertained by evaluating the candidate
3 entity by simulating the candidate entity.

1 16. The process defined in Claim 1 wherein selecting the candidate entity that
2 more closely satisfies the design requirement is ascertained by evaluating the candidate
3 by observing a physical realization representing the candidate entity.

1 17. The process defined in Claim 1 wherein the candidate entity conforms to a
2 constrained syntactic structure.

1 18. The process defined in Claim 1 wherein the candidate entity comprises an
2 electrical circuit.

1 19. The process defined in Claim 1 wherein the candidate entity comprises a
2 controller.

1 20. The process defined in Claim 1 wherein the candidate entity comprises an
2 antenna.

1 21. The process defined in Claim 1 wherein the candidate entity comprises a
2 mechanical system.

1 22. An iterative computer-implemented process for creating an entity that
2 approximately satisfies a design requirement that includes technical requirements and
3 dissimilarity to preexisting technology, the process invoking iterations, each iteration
4 comprising:

- 5 producing a structure;
6 determining behavior and characteristics of the structure;
7 comparing the structure to preexisting technology;
8 determining fitness of the structure by combining compliance with the technical
9 requirements and dissimilarity to preexisting technology.

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